



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification<sup>3</sup> :</b> <b>H04N 7/14, 7/12, 7/08</b>	<b>A1</b>	<b>(11) International Publication Number:</b> <b>WO 84/ 00863</b> <b>(43) International Publication Date:</b> 1 March 1984 (01.03.84)
<b>(21) International Application Number:</b> PCT/US83/01283 <b>(22) International Filing Date:</b> 19 August 1983 (19.08.83) <b>(31) Priority Application Number:</b> 409,566 <b>(32) Priority Date:</b> 19 August 1982 (19.08.82) <b>(33) Priority Country:</b> US  <b>(71) Applicant:</b> WORLD VIDEO LIBRARY, INC. [US/US]; 306 West Seventh Street, Fort Worth, TX 76102 (US). <b>(72) Inventor:</b> ABRAHAM, Nicholas, F. ; 4208 Country Club Boulevard, Cape Coral, FL 33904 (US). <b>(74) Agent:</b> SHUSTER, Jacob; 2001 Jefferson Davis Highway, Arlington, VA 22202 (US).		<b>(81) Designated States:</b> AT (European patent), AU, BE (European patent), BR, CH (European patent), DE (European patent), DK, FI, FR (European patent), GB (European patent), HU, JP, KP, LU (European patent), MC, NL (European patent), NO, RO, SE (European patent), SU.  <b>Published</b> <i>With international search report.</i>
<b>(54) Title:</b> RECORDED PROGRAM COMMUNICATION SYSTEM		
<pre> graph LR     12[SUBSCRIBER STATION] --&gt; 10[TELEPHONE COMMUNICATION NETWORK]     10 --&gt; 14[SUBSCRIPTION SERVICE STATION]     14 --&gt; 18[SUBSCRIPTION CABLE PATH]     18 --&gt; 12       </pre>		
<b>(57) Abstract</b>		
<p>A two-way telephone network (16) between a subscription television broadcast location and a plurality of subscriber stations (12) having standard broadcast signal receivers provides dialed telephone links through which subscribers select recorded programs in a library at the broadcast location for reception on the standard signal receivers, the broadcast signals being transmitted along one-way signal paths (18) from the broadcast transmitter to the subscriber stations. Signal processing at the broadcast location and special signal detection and traffic control at the subscriber stations prevents unauthorized reception.</p>		

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DescriptionRECORDED PROGRAM COMMUNICATION SYSTEMBACKGROUND OF THE INVENTION

5 This invention relates to a method of  
generating and processing audio/video broadcast  
signals in a subscription communication system  
of the type disclosed in my prior copending  
application, Serial No. 383,604, filed June 1,  
1982 with respect to which the present invention  
10 is a continuation-in-part.

According to the disclosure in my prior  
copending application, a subscription service  
station has a program library formed by a plurality  
of recorded audio/video signal sources from which  
15 selected program material is broadcast through  
signal carrier cable or the like to subscriber  
stations in response to dialing code selection  
signals transmitted by standard telephone communica-  
tion. Transmission from a selected recorded program  
20 source in the library is delayed to establish a  
preceding message period during which program  
identification and other information is broadcast to  
the subscriber station.

Various multiplexing methods were  
25 contemplated in connection with the foregoing  
communication system for servicing a sufficient  
number of subscriber stations to make the system  
economically feasible. It is however an important  
object of the present invention to provide a method  
30 of processing the program signals in such as manner



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as to further increase the number of subscribers capable of being serviced and to permit enlargement of the program content of the library from which selections may be made.

5           Other objects consistent with the foregoing object are to enhance unauthorized use security of the subscription communication system without drastic modification of the standard television receiver at the subscriber stations.

10       SUMMARY OF THE INVENTION

          In accordance with the present invention a plurality of recorded audio/video programs of a storage library are readout in sequence as segments of a broadcast signal during repeated transmission  
15       periods that are time compressed for broadcast through a leased cable communication path, for example, to the subscriber stations. The library readout signals are accordingly digitized and processed through a signal time compression type  
20       of multiplexer. At each subscriber station, a selected program segment of the broadcast signal is detected, time expanded and then converted into analog form for reproduction through standard circuits of a television receiver. Program signal  
25       segment selection is effected through local sonic transmission of a selection code periodically published in a directory distributed by the subscription service company to subscribers. The selection code forms part of the dialing code  
30       inputted to a conventional telephone instrument by a



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subscriber to establish a telephone link with the remote service station at which the storage library is located.

5           The selection code is operative at the service station to activate a selected one of a plurality of changeable message signal sources corresponding to the selected program segment. The message signal from the activated signal source is inserted into the aforementioned time compressed  
10 broadcast signal during spacing intervals between the program segments. The simultaneous occurrence of the same selection code in the dialing signal received at the service station and in the output broadcast signal at the end of a selected message  
15 interval triggers delayed operation of a billing computer by the subscriber identification portion of the dialing code.

          The broadcast signal is digitized and time compressed so as to enlarge the subscription audience  
20 handling capability of the system. Time compression multiplexing of video signals as a function of the number of signal sources is generally known as disclosed, for example, in U.S. Patent No. 4,300,161 to Haskell. However, in accordance with the present  
25 invention, the time delays introduced during the signal processing operation of such multiplexer are utilized to establish the spacing intervals between program segments into which selected message signals are inserted.

30           Time expansion of the compressed signal



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segment detected at the subscriber station is accomplished through a two speed recorder/player device of the type disclosed, for example, in U.S. Patent No. 2,987,614 to Robert et al. A  
5 light wave recording disc is however utilized as the eraseable recording medium to enable use of a sufficiently high recording speed and to enlarge its recording content for the particular purposes of the present invention.

10 BRIEF DESCRIPTION OF DRAWING FIGURES

Figure 1 is a simplified block diagram illustrating the communication system of the present invention.

15 Figure 2 is a block diagram illustrating in greater detail the system at a subscriber station.

Figure 3 is a simplified circuit diagram of the signal time expander associated with the system at each subscriber station.

20 Figure 4 is a block diagram illustrating in greater detail the system at the service station.

Figure 5 is a graphical illustration depicting certain operational characteristics of the system.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

25 Referring now to the drawings in detail, Figure 1 diagrammatically illustrates the general arrangement of a communication system referred to by reference numeral 10 with which the present invention is associated. One of a plurality of  
30 subscriber stations 12 are shown linked with a



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common service station 14 through an existing telephone communication network 16. Video/audio program material stored at the service station 14 is transmitted to the subscriber stations 5 through a subscription cable path 18 or other equivalent communication path which is independent of the telephone communication network. Generally, the system operates in response to coded telephone signals dialed at any one of the subscriber stations 10 to establish a telephone link with the service station 14 and select program material in its library for broadcast through the communication path 18 to the subscriber station from which such selection signal originates. When a selected 15 program is transmitted to a station 12 through the communication path 18 in response to a dialed signal, an identification code in the dialed signal registers such transmission for billing purposes. The foregoing arrangement and operation of the 20 system 10 is generally similar to that disclosed in my prior co-pending application, aforementioned.

In accordance with the present invention, each subscriber station 12 includes a standard telephone instrument 20 as diagrammed in Figure 2 25 from which dialed signals are transmitted by the usual telephone lines 22 to a central telephone utility exchange 24 through which the telephone links are established to receiving stations including the service station 14 aforementioned. 30 In addition to the usual station dialing code



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transmitted by lines 22 for establishing the telephone link with service station 14, the telephone dialed signal will include an identification code corresponding to the particular subscriber station and a program selection code. The presence of any program selection code will trigger operation of sonic transmitter 26 the output of which is received by a sonic receiving enabler component 28. The component 28 enables a broadcast segment detector 30 thereby rendered operative to detect the selected code in the program signal and extract a segment of a continuous broadcast signal received through the subscription cable path 18 by the signal carrier receiver circuits 32 at the subscriber station. The signal carrier receiver circuits from part of a standard television receiver including the standard signal processing circuits 34 and the standard video/audio reproducing circuits 36. Certain channels set aside for transmission of subscription programs will however be processed by the detector 30 as aforementioned and fed to a signal time expander 32. The signal time expander is operative to convert continuous program information that is in a time compressed digital form into real time digital information fed to a digital-to-analog convertor 37. Thus, the components 30, 32, and 37 added to the standard television receiver are operative to process subscription program information selected for reproduction through the standard television





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receiver with a high degree of unauthorized use security.

According to one embodiment of the invention as illustrated in Figure 3, the signal time expanding operation of component 32 is accomplished by recording the input signal from component 30 by means of a record head 38 on a light wave type of recording disc 40. In response to such input signal, a two-speed record drive 42 is conditioned for effecting a recording operation at a relatively high recording speed corresponding to the signal time compression associated with the incoming signal as will be explained hereinafter. Thus, a continuous program signal is recorded during a segment of a time compressed transmission period on the record medium 40. At the end of such recording operation, a coded portion of the incoming signal is operative to switch operation of the record drive 42 to the playback mode. In the playback mode, the record drive will advance the record medium in the opposite direction at a relatively low speed for signal pickup by the head 44 in real time. The output signal from the pick up head 44 will be operative through an eraser oscillator 46 and an eraser head 48 to erase the recorded signal on the record medium 40 so that it will be available for subsequent recording of incoming signals.

The telephone dialed signal originating from one or more subscriber stations is received at the service station 14 diagrammed in greater detail



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in Figure 4. Such dialed signals are received at a dial switching gear 50, one at a time, through use of a busy signal generating arrangement well known in the art. Each dialed signal will thus be transmitted with its selection and identification code to an output code line 52. The identification and selection codes in the output line 52 are applied to a gate logic circuit component 54, a program selector component 56 and to a program library 58. The program library includes a plurality of signal sources in the form of continuous recorded video/audio programs respectively having a real time signal duration of 1/2 hour to two hours, for example. In response to reception of any signal input, the program library will be triggered into repeated readout operation wherein each of the signal sources sequentially delivers segments of the total program material stored. At the same time, the signal selection code operates the program selector 56 so as to activate a selected one of a plurality of message signal sources 62 having outputs interconnected with corresponding signal segment outputs 60(1), 60(2)--60(n) of the program library. The signal outputs of the program library 58 and message signal sources 62 being in analog form, are fed to an analog-to-digital converter 64 so as to deliver digital outputs in lines 66(1), 66(2)-- 66(n) to a time compression multiplexer 68. Thus, the video/audio information content of the signal



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sources in program library 58 and message signal sources 62 are digitized and compressed time-wise for transmission through line 94 to a signal carrier transmitter 70 during time compressed transmission periods of relatively short duration as compared to the real time duration. The signal time compressed output is transmitted by the transmitter 70 to the subscriber stations through the subscription communication path 18 as aforementioned.

10           The message and code information of the plurality of message signal sources 62 are inserted during program spacing intervals between the signal segment readout from the program library 58. Toward that end, a delay circuit component 72 is provided synchronized with operation of the multi-plexer 68 by control line 86. A delay signal line 74 from the delay circuits 72 controls readout operation of the program library in order to establish the program spacing intervals into which the outputs of signal sources 62 are inserted under control of the delay circuits through line 76. Output line 94 from the multiplexer 68 also provides an input to the gate logic circuits 54 at the end of a program spacing interval so as to establish a signal conducting path for the identification code supplied thereto by output line 52. When enabled by the signal output, the gate logic circuits will register the transmission of the following signal segment by triggering operation of the billing computer 78 in response to matching codes in



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output lines 52 and 94. Accordingly, each subscriber may be billed for each program selection made. Further, the gate logic circuits 54 will be operable to cancel registration of any program selection and subscriber billing operation if  
5 another telephone dialed signal is received during the program spacing interval. It is during such program spacing intervals that a message corresponding to the selected signal segment is inserted  
10 to identify the forthcoming program in order to provide the subscriber an opportunity to cancel as well as to provide an opportunity for sponsors to broadcast commercials as noted in my prior copending application aforementioned.

15 In accordance with one embodiment of the invention, the time compression multiplexer 68 may be of the type disclosed in U.S. Patent No. 4,300,161 aforementioned. However, in accordance with the present invention, delay  
20 synchronizing signals are fed therefrom to the delay circuits 72 through signal line 86 for establishing the program spacing intervals between signal segments and synchronizing the insertion of selected message information.

25 Operation of the delay circuits 72 in controlling the timing of the outputs from the program library 58 and message signal sources 62 is graphically illustrated in Figure 5. As shown, the program segments sequentially readout from the  
30 program library during each transmission period 80,



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are represented by reference numeral 88. These program segments are separated by spacing intervals 90. For each subscriber station linked to the service station during a timed compressed transmission period 80, a selected message signal 92 will be broadcast during one of the spacing intervals preceding the selected program segment detected at the subscriber station as hereinbefore described.

According to one embodiment of the invention, the entire content of one program library will be readout during repeated transmission periods that are time compressed to reduce the waiting time for reception of a selected program by a wider audience as well as to provide unauthorized use security. Thus, the waiting time will usually be less than the duration of a time compressed transmission period since an incoming selection signal at the service station will often occur before the desired program segment selected is broadcast. The waiting time will be further reduced by insertion of the message signal corresponding to the selected program segment.



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CLAIMS

1. In a communication system having a plurality of subscriber stations at which standard broadcast signal receivers are located for reception of broadcast signals from a broadcast transmitter at a remote location through a one-way signal carrier network and a telephone network through which dialed telephone links are established between the subscriber stations and said remote location, the improvement comprising a library of recorded program material at the remote location, signal processing means operatively connecting the library to the broadcast transmitter for transmission of said program material through the one-way signal carrier network, selection control means at the subscriber stations for transmitting program selection signals through the dialed telephone links to said remote location and controlling reception of the transmitted program material by the standard signal receivers, and means for inserting signals to the program material supplied by the signal processing means to the broadcast transmitter in response to the transmitted selection signals.



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2. The system of claim 1 including billing means enabled by the transmitted selection signals for registering said insertion of the signals to the program material.
- 5 3. The system of claim 2 wherein the inserted signals have a message content.
4. The system of claim 3 wherein the signal processing means includes means for dividing the program material into time compressed segments having program spacing intervals  
10 therebetween occupied by the inserted signals, and means at the subscriber stations for expansion of the time compressed segments to provide for real time signal reproduction  
15 through the standard signal receivers.
5. The system of claim 4 including means at the subscriber stations for cancelling said registration by the billing means prior to termination of the program spacing intervals.
- 20 6. The system of claim 1 wherein the signal processing means includes means for dividing the program material into time compressed segments having program spacing intervals therebetween.



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Fig. 1

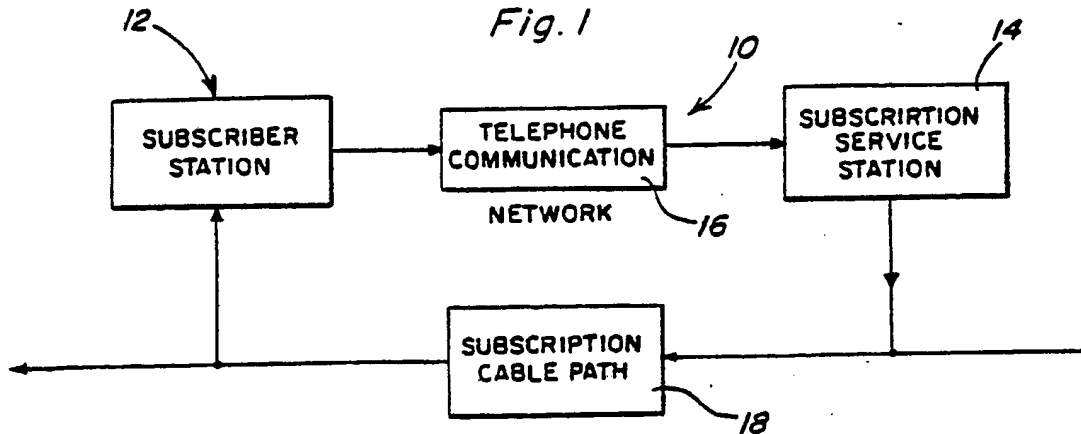
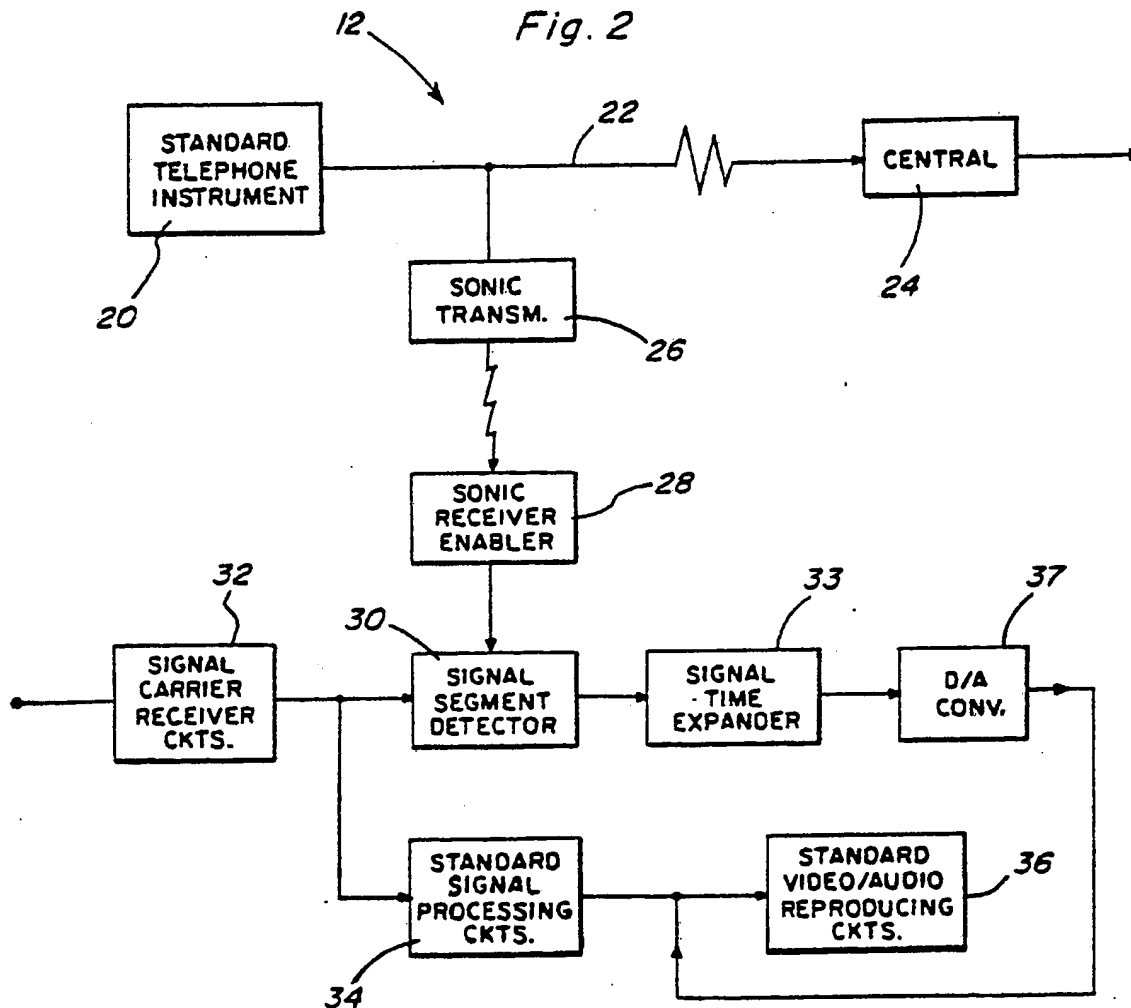


Fig. 2





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Fig. 3

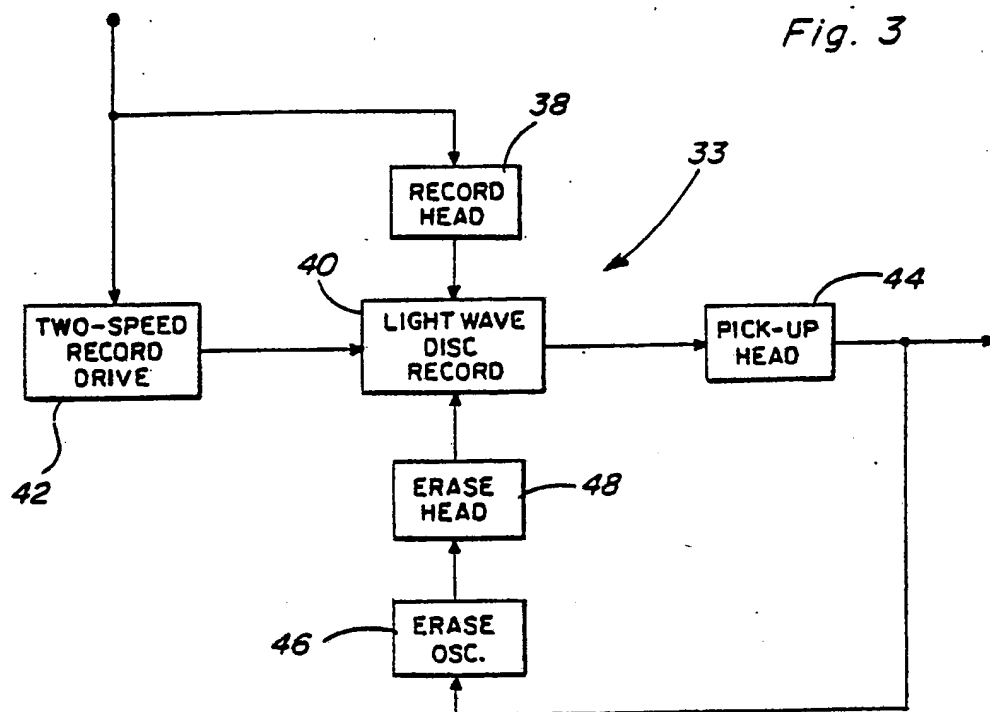


Fig. 5

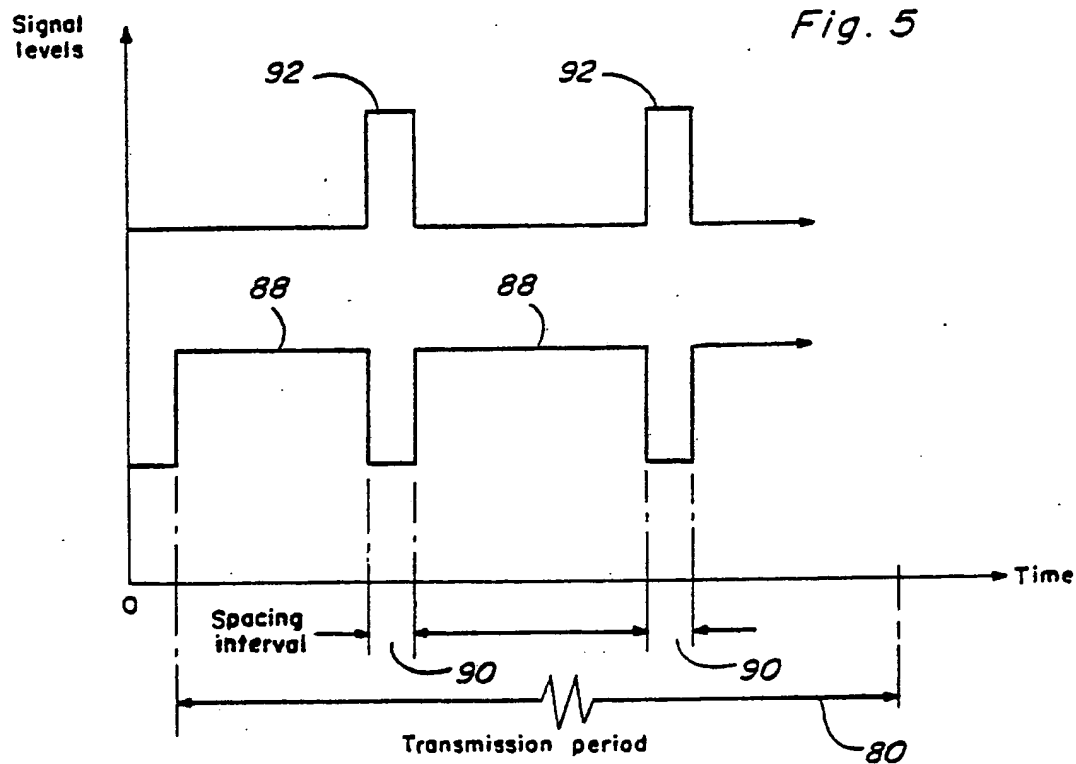
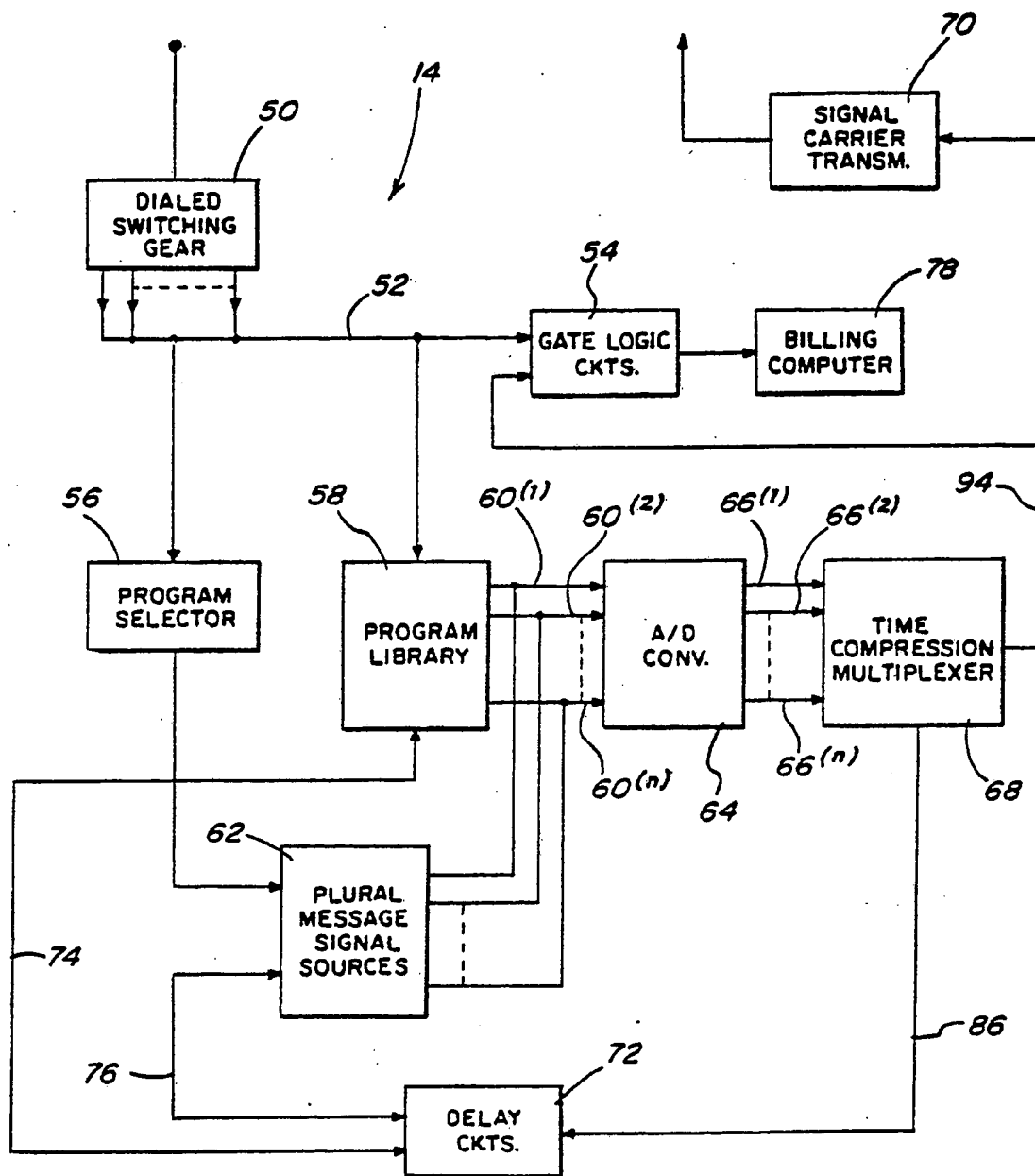


Fig. 4



# INTERNATIONAL SEARCH REPORT

International Application No PCT/US83/01283

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (If several classification symbols apply, indicate all) <sup>3</sup> According to International Patent Classification (IPC) or to both National Classification and IPC INT. CL. <sup>3</sup> HO4N 7/14; 7/12; 7/08																				
<b>II. FIELDS SEARCHED</b> <div style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black;">Minimum Documentation Searched <sup>4</sup></div> <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 20%; border: 1px solid black; text-align: left;">Classification System</th> <th style="border: 1px solid black; text-align: left;">Classification Symbols</th> </tr> <tr> <td style="border: 1px solid black; vertical-align: top; padding: 5px;">U.S.</td> <td style="border: 1px solid black; vertical-align: top; padding: 5px;">358-85, 86, 133, 142 455-3, 5</td> </tr> </table> <div style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black;">Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched <sup>5</sup></div>			Classification System	Classification Symbols	U.S.	358-85, 86, 133, 142 455-3, 5														
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<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT</b> <sup>14</sup> <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 10%; border: 1px solid black; text-align: left;">Category <sup>*</sup></th> <th style="width: 70%; border: 1px solid black; text-align: left;">Citation of Document, <sup>16</sup> with indication, where appropriate, of the relevant passages <sup>17</sup></th> <th style="width: 20%; border: 1px solid black; text-align: left;">Relevant to Claim No. <sup>18</sup></th> </tr> <tr> <td style="border: 1px solid black; text-align: center; vertical-align: top;">X</td> <td style="border: 1px solid black; vertical-align: top;">U.S, A, 4,008,369, Theurer et al. 15 February 1977</td> <td style="border: 1px solid black; text-align: center; vertical-align: top;">1</td> </tr> <tr> <td style="border: 1px solid black; text-align: center; vertical-align: top;">A</td> <td style="border: 1px solid black; vertical-align: top;">U.S, A, 4,264,925, Freeman et al. 28 April 1981</td> <td style="border: 1px solid black; text-align: center; vertical-align: top;">2-3</td> </tr> <tr> <td style="border: 1px solid black; text-align: center; vertical-align: top;">A</td> <td style="border: 1px solid black; vertical-align: top;">U.S, A, 4,124,873, Chesarek 14 November 1978</td> <td style="border: 1px solid black; text-align: center; vertical-align: top;">4-6</td> </tr> <tr> <td style="border: 1px solid black; text-align: center; vertical-align: top;">A</td> <td style="border: 1px solid black; vertical-align: top;">U.S, A, 4,300,161, Haskell 10 November 1981</td> <td style="border: 1px solid black; text-align: center; vertical-align: top;">4-6</td> </tr> <tr> <td style="border: 1px solid black; text-align: center; vertical-align: top;">A</td> <td style="border: 1px solid black; vertical-align: top;">U.S, A, 3,968,327, Gregg, III 6 July 1976</td> <td style="border: 1px solid black; text-align: center; vertical-align: top;">1</td> </tr> </table>			Category <sup>*</sup>	Citation of Document, <sup>16</sup> with indication, where appropriate, of the relevant passages <sup>17</sup>	Relevant to Claim No. <sup>18</sup>	X	U.S, A, 4,008,369, Theurer et al. 15 February 1977	1	A	U.S, A, 4,264,925, Freeman et al. 28 April 1981	2-3	A	U.S, A, 4,124,873, Chesarek 14 November 1978	4-6	A	U.S, A, 4,300,161, Haskell 10 November 1981	4-6	A	U.S, A, 3,968,327, Gregg, III 6 July 1976	1
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<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p><sup>*</sup> Special categories of cited documents: <sup>15</sup></p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 50%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&amp;" document member of the same patent family</p> </div> </div>																				
<b>IV. CERTIFICATION</b> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; border: 1px solid black; vertical-align: top; padding: 5px;">           Date of the Actual Completion of the International Search <sup>2</sup>   <div style="text-align: center;">27 Oct 1983</div> </td> <td style="width: 50%; border: 1px solid black; vertical-align: top; padding: 5px;">           Date of Mailing of this International Search Report <sup>1</sup>   <div style="text-align: center; font-size: 1.2em;">16 NOV 1983</div> </td> </tr> <tr> <td style="border: 1px solid black; vertical-align: top; padding: 5px;">           International Searching Authority <sup>1</sup>   <div style="text-align: center;">ISA/US</div> </td> <td style="border: 1px solid black; vertical-align: top; padding: 5px;">           Signature of Authorized Officer <sup>10</sup>  </td> </tr> </table>			Date of the Actual Completion of the International Search <sup>2</sup>  <div style="text-align: center;">27 Oct 1983</div>	Date of Mailing of this International Search Report <sup>1</sup>  <div style="text-align: center; font-size: 1.2em;">16 NOV 1983</div>	International Searching Authority <sup>1</sup>  <div style="text-align: center;">ISA/US</div>	Signature of Authorized Officer <sup>10</sup> 														
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